

WHAT IS CLAIMED IS AS FOLLOWS:

1. A fiber optic adapter for use with two optical fiber connectors, each connector including a ferrule holding an end of an optical fiber, the adapter comprising:

a housing including a first end and a second end, and an axial opening defined from the first end to the second end, the axial opening having an axial length and a midpoint, each of the first end and the second end of the housing are sized to receive one of the optical fiber connectors;

an attenuation hub having a first ferrule end, a second ferrule end, a midpoint and an axial opening including an optical fiber defining an optical path from the first end of the hub to the second end of the hub;

the attenuation hub positioned within the axial opening of the housing such that the optical fiber is parallel to the axial opening and the midpoint of the attenuation hub is located at the midpoint of the housing, wherein the first and second ends of the housing allow the optical fiber of the ferrule of each connector to be optically coupled with the optical fiber of the attenuation hub;

means for mounting the housing to an opening in a bulkhead.

2. The adapter of claim 1, wherein the optical fiber of the attenuation hub includes a continuous segment from the first end of the attenuation hub to the second end of the attenuation hub.

3. The adapter of claim 1, wherein the optical fiber of the attenuation hub includes two segments fused to each other within the attenuation hub.

4. The adapter of claim 1, wherein the optical fiber of the attenuation hub includes two segments, each segment having an outer end and an inner end, and an air gap defined in the optical path between the inner ends of the optical fiber segments.

5. The adapter of claim 1, wherein the optical fiber of the attenuation hub includes two segments, each segment having an outer end and an inner end, and a filter mounted between the inner ends of the optical fiber segments.

6. The adapter of claim 1, wherein the first and second ends of the housing are each sized to receive an SC connector.

7. The adapter of claim 6, wherein the housing includes two opposing sides parallel to the axial opening, a top and an opposing bottom parallel to the axial opening, and the means for mounting includes mounting tabs extending outward in opposite directions from the housing.

8. The adapter of claim 7, wherein the attenuation hub is included within an assembly, the assembly further comprising:

two halves which form an inner housing, the inner housing enclosing the attenuation hub and having a first open end proximate the first end of the hub and a second open end proximate the second end of the hub;

the inner housing including a first sleeve proximate the first open end and a second sleeve proximate the second open end, the first and second sleeves each adapted for receiving the ferrule of one of the optical fiber cable connectors;

the attenuation hub mounted within the inner housing between the first and second sleeves and engaging the sleeves;

the sleeves positioned to align the optical fiber of the connector received by the first end of the housing with the optical fiber at the first end of the attenuation hub, and the optical fiber of the connector received by the second end of the housing with the optical fiber at the second end of the attenuation hub.

9. A fiber optic adapter comprising:

a housing including a first end and a second end, and an optical pathway connecting the first end with the second end;

a first sleeve having a first end and a second end, the first end of the first sleeve proximate the first end of the adapter, and a second sleeve having a first end and a second end, the second end of the second sleeve proximate the second end of the adapter, the sleeves defining an inner passage to receive optical fiber ferrules in both the first and second ends;

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an attenuation hub mounted within the interior of the housing including optical fiber, the first end of the attenuation hub received by the second end of the first sleeve and the second end of the attenuation hub received by the first end of the second sleeve;

the housing including first and second stop surfaces spread apart in an axial direction, the attenuation hub and first and second sleeves positioned between the first and second stop surfaces and fixed from axial movement such that the attenuation hub and sleeves cannot be removed from the housing; and

the first and second ends of the housing each sized to receive an optical fiber cable connector.

10. The adapter of claim 9, wherein the optical fiber of the attenuation hub includes a continuous segment from the first end of the attenuation hub to the second end of the attenuation hub.

11. The adapter of claim 9, wherein the optical fiber of the attenuation hub includes two segments fused to each other within the attenuation hub.

12. The adapter of claim 9, wherein the optical fiber of the attenuation hub includes two segments, each segment having an outer end and an inner end, and an air gap defined in the optical path between the inner ends of the optical fiber segments.

13. The adapter of claim 9, wherein the optical fiber of the attenuation hub includes two segments, each segment having an outer end and an inner end, and a filter mounted between the inner ends of the optical fiber segments.

14. The adapter of claim 9, further comprising a first optical fiber cable including a first optical fiber and a first optical fiber connector with a first ferrule holding an end of the optical fiber contained by the first optical fiber cable, wherein the first optical fiber connector is received by the first end of the adapter, the first ferrule engaging the first end of the first sleeve, and the optical fiber of the first optical fiber cable optically connected with the optical fiber of the attenuation hub.

15. The adapter of claim 14, further comprising a second optical fiber cable including a second optical fiber and a second optical fiber connector with a second ferrule holding an end of the optical fiber contained by the second optical fiber cable, wherein the second optical fiber connector is received by the second end of the adapter, the second ferrule engaging the second end of the second sleeve, and the optical fiber of the second optical fiber cable optically connected with the optical fiber of the attenuation hub.

16. A fiber optic adapter for use with two optical fiber connectors, each connector including a ferrule holding an end of an optical fiber, the adapter comprising:

a housing including a first end and a second end, and an axial opening defined from the first end to the second end, the axial opening having an axial length and a midpoint, each of the first end and the second end of the housing are sized to receive one of the optical fiber connectors;

an attenuation hub having a first ferrule end, a second ferrule end and an axial opening including an optical fiber defining an optical path from the first end of the hub to the second end of the hub;

two halves which form an inner housing, the inner housing enclosing the attenuation hub and having a first open end proximate the first end of the hub and a second open end proximate the second end of the hub;

a first sleeve proximate the first open end and a second sleeve proximate the second open end, the first and second sleeves each adapted for receiving the ferrule of one of the optical fiber cable connectors;

the attenuation hub positioned within the inner housing between the first and second sleeves and engaging the sleeves;

the first and second sleeves positioned to optically align the optical fiber of the connector received by the first end of the housing with the optical fiber at the first end of the attenuation hub, and the optical fiber of the connector received by the second end of the housing with the optical fiber at the second end of the attenuation hub;

the inner housing including two inner opposing shoulders holding the first and second sleeves and the attenuation hub within the inner housing;

the housing including opposing walls in the axial opening engaged with outer edges on the inner housing;

the attenuation hub positioned within the axial opening of the housing such that the optical fiber is parallel to the axial opening and the attenuation hub is located at the midpoint of the housing, wherein the first and second ends of the housing allow the optical fiber of the ferrule of each connector to be in optical contact with the optical fiber of the attenuation hub;

means for mounting the housing to an opening in a bulkhead.

17. The adapter of claim 16, wherein the optical fiber of the attenuation hub includes a continuous segment from the first end of the attenuation hub to the second end of the attenuation hub.

18. The adapter of claim 16, wherein the optical fiber of the attenuation hub includes two segments fused to each other within the attenuation hub.

19. The adapter of claim 16, wherein the optical fiber of the attenuation hub includes two segments, each segment having an outer end and an inner end, and an air gap defined in the optical path between the inner ends of the optical fiber segments.

20. The adapter of claim 16, wherein the optical fiber of the attenuation hub includes two segments, each segment having an outer end and an inner end, and a filter mounted between the inner ends of the optical fiber segments.

21. A fiber optic bulkhead adapter assembly comprising:

an adapter including:

a housing with a first open end and a second open end, the housing defining an axial cavity from the first open end to the second open end;

an attenuation hub having a first end and a second end, the attenuation hub including a length of optical fiber extending between the ends; and

two sleeves, each sleeve engaging one of the first and second attenuation hub ends;

the attenuation hub and sleeves positioned within the axial cavity of the housing and defining an axial opening with a first end and a second end proximate the first open end of the housing and the second open end of the housing, respectively;

a bulkhead having a first side and a second side and defining an opening sized and shaped to receive the housing of the fiber optic adapter such that the first open end of the adapter is positioned proximate the first side and the second open end of the adapter is proximate the second side, the adapter mounted in the bulkhead opening such that a plane defined by the bulkhead passes through the attenuation hub;

22. The assembly of claim 21, wherein the optical fiber of the attenuation hub includes a continuous segment from the first end of the attenuation hub to the second end of the attenuation hub.

23. The assembly of claim 21, wherein the optical fiber of the attenuation hub includes two segments fused to each other within the attenuation hub.

24. The assembly of claim 21, wherein the optical fiber of the attenuation hub includes two segments, each segment having an outer end and an inner end, and an air gap defined in the optical path between the inner ends of the optical fiber segments.

25. The assembly of claim 21, wherein the optical fiber of the attenuation hub includes two segments, each segment having an outer end and an inner end, and a filter mounted between the inner ends of the optical fiber segments.

26. The assembly of claim 21, wherein a first cable including a first optical fiber and a first connector, the first connector including a body and a first ferrule, the body received in one of the open ends of the adapter housing and the first ferrule holding an end of the first optical fiber, the first ferrule received within the axial opening and engaging one of the sleeves of the attenuation hub within the adapter wherein the first optical fiber held by the first ferrule is in optical contact with the optical fiber within the attenuation hub.

27. The assembly of claim 21, further comprising a second cable including a second optical fiber and a second connector, the second connector including a body and a second ferrule, the body received in the other open end of the adapter housing, the second ferrule holding an end of the second optical fiber, the second ferrule received within the axial opening and engaging the other of the sleeves of the attenuation hub within the adapter when the second connector is inserted into an open end of the adapter, wherein the second connector inserted into the second open end of the adapter such that the second optical fiber of second cable is in optical contact with the optical fiber within the attenuation hub.

28. A fiber optic bulkhead adapter assembly comprising:

a fiber optic adapter including:

a housing with a first open end and a second open end, the housing defining an axial cavity from the first open end to the second open end;

an attenuation hub having a first end and a second end, the attenuation hub including a length of optical fiber extending between the ends; and a sleeve engaging each of the first and second attenuation hub ends;

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the attenuation hub and sleeves positioned within the axial cavity of the housing and defining an axial opening with a first end and a second end proximate the first open end of the housing and the second open end of the housing, respectively, the hub and sleeves fixed from axial movement such that the hub and the first and second sleeves cannot be removed from the housing;

a bulkhead having a first side and a second side and defining an opening sized and shaped to receive the housing of the fiber optic adapter such that the first open end of the adapter is positioned proximate the first side and the second open end of the adapter is proximate the second side, the adapter mounted in the bulkhead opening; and

29. The assembly of claim 28, wherein the optical fiber of the attenuation hub includes a continuous segment from the first end of the attenuation hub to the second end of the attenuation hub.

30. The assembly of claim 28, wherein the optical fiber of the attenuation hub includes two segments fused to each other within the attenuation hub.

31. The assembly of claim 28, wherein the optical fiber of the attenuation hub includes two segments, each segment having an outer end and an inner end, and an air gap is defined in the optical path between the inner ends of the optical fiber segments.

32. The assembly of claim 28, wherein the optical fiber of the attenuation hub includes two segments, each segment having an outer end and an inner end, and a filter is mounted between the inner ends of the optical fiber segments.

33. The assembly of claim 28, wherein a first cable including a first optical fiber and a first connector, the first connector including a body and a first ferrule, the body received in one of the open ends of the adapter housing and the first ferrule holding an end of the first optical fiber, the first ferrule received within the axial opening and engaging one of the sleeves of the attenuation hub within the adapter wherein the first optical fiber held by the first ferrule is in optical contact with the optical fiber within the attenuation hub.

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34. A method of assembling a fiber optic bulkhead adapter comprising the steps of:
providing an attenuation hub including a first end with a first contact face and a second end with a second contact face and optical fiber extending from the first face to the second face;

placing a sleeve sized and shaped to engage one of the first or second end of the attenuation hub on each end of the attenuation hub;

inserting the attenuation hub into a housing, the housing including an axial opening having open ends, the axial opening including sleeve stops proximate each open end, so that the sleeve stops hold the sleeves and the attenuation hub within the axial opening.

35. The method of claim 34, wherein the optical fiber of the attenuation hub includes a continuous segment from the first end of the attenuation hub to the second end of the attenuation hub.

36. The method of claim 34, wherein the optical fiber of the attenuation hub includes two segments fused to each other within the attenuation hub.

37. The method of claim 34, wherein the optical fiber of the attenuation hub includes two segments, each segment having an outer end and an inner end, and an air gap defined in the optical path between the inner ends of the optical fiber segments.

38. The method of claim 34, wherein the optical fiber of the attenuation hub includes two segments, each segment having an outer end and an inner end, and a filter mounted between the inner ends of the optical fiber segments.

39. The method of claim 34, wherein the housing is an inner housing and further comprises a main housing including an access opening providing access to an axial cavity with a first open end and a second open end, and a cover sized and shaped to fit within and close the access opening, the method further comprising the steps of;

inserting the inner housing through the access opening into the axial cavity of the main housing such that the open ends of the axial opening are accessible through the open ends of the main housing;

placing the cover in the access opening to close the access opening and hold the inner housing within the axial cavity of the main housing.

40. A method of using a fiber optic bulkhead adapter comprising the steps of:

providing a fiber optic adapter with open ends and an integral optical fiber ferrule including an attenuator;

mounting the fiber optic adapter directly to an opening defined in a bulkhead.

41. The method of claim 40, further including the step of:

connecting a fiber optic cable connector to each open end, each fiber optic cable connector connected to a fiber optic cable.